Organizational Structure and Tax Avoidance:

Multinational Evidence from Business Group Affiliation

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Abstract:

We investigate whether business group affiliation affects tax avoidance in a global setting. The business group structure could facilitate tax avoidance by allowing the ultimate owner to transfer resources and income across group firms. However, nontax costs such as price discounts by minority shareholders and agency costs could deter tax avoidance. Overall, we find evidence that business group firms exhibit greater tax avoidance than stand-alone firms, but the effect is restricted to firms in countries with developed economies where the nontax costs are lower. In contrast, we find that business group firms exhibit lower tax avoidance in emerging market countries, where the nontax costs are higher. In supplemental tests we find that the positive relation between business group affiliation and tax avoidance is driven by business groups in developed market countries with code law legal systems. Thus, our evidence suggests that common law systems also deter tax avoidance by business group firms. While our findings are not conclusive, they provide evidence regarding how the impact of organizational structure on tax avoidance differs across countries.

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1. Introduction

A considerable literature has developed to identify factors that impact the extent of a firm's tax avoidance.[1] One such factor is the ownership structure of the firm. Examples include studies of founding families (Chen, Chen, Cheng and Shevlin, 2010) and dual-class shares (McGuire, Wang, and Wilson, 2014). In this study we extend this literature to a global setting by using an international sample from 38 countries, including 22 developed and 16 emerging economies. Specifically, we focus on the business group, one of the most common organizational forms internationally and examine whether business group firms exhibit a greater, or lesser degree of tax avoidance than stand-alone firms. We also consider whether the development stage of a country's economy differentially affects the impact of business group affiliation on the extent of the firm's tax avoidance.

The business group as an organizational form is particularly interesting because it is one of the most common and heavily researched forms around the world. While the literature has documented that business groups can increase firm value by creating an internal capital market, it is not known whether the ability to transfer resources between member firms is used to shift income between firms to reduce their tax liability. In addition, business group firms are likely to incur non-tax costs such as price discounts by minority shareholders and agency costs similar to those documented in the U.S. for family controlled firms and dual-class firms, respectively. Therefore, it is not clear whether firms affiliated with a business group would exhibit lower degrees of tax avoidance than stand-alone firms in the presence of these additional costs.

[1] Examples include CEO characteristics (Dyreng, Hanlon, and Maydew 2010), CEO compensation (Rego and Wilson 2012), monitoring from labor unions (Chyz, Leung, Li, and Rui 2013) and hedge funds (Cheng, Huang, Li and Stanfield 2012), and country characteristics (Atwood, Drake, Myers and Myers 2012).

The business group ownership structure is prevalent around the world and is notable for the separation of ownership from control through pyramidal ownership structure and cross-shareholding (Bertrand, Mehta and Mullainathan 2002; Bae, Kang and Kim 2002; Joh 2003 and Baek, Kang, and Lee 2006).[2] Business groups generally include several legally independent firms that are connected via an ownership structure in which an ultimate owner is the controlling shareholder for a set of companies that are, in turn, the controlling shareholders of other firms.[3]

A key advantage of the business group structure is that it creates an internal capital market that facilitates the transfer of capital between group affiliated firms to overcome imperfect capital markets, especially in emerging market countries (e.g., Khanna and Rivkin 2001, Mahmood and Mitchell 2004, Chang, Chung and Mahmood. 2006). While prior literature has focused on its ability to facilitate transfers of capital for investment, the business group structure could also enable ultimate owners to allocate resources across units to take advantage of favorable tax provisions such as tax credits for specific types of investments, and low tax rates. The common (and often centralized) control by ultimate owners could also allow group member firms to shift taxable income, through transfer pricing or resource allocation, to minimize the tax liability of business group firms.

However, prior research has documented evidence that the extent of tax avoidance is limited by nontax costs associated with a firm's organizational form. Chen et al. (2010) find that family controlled U.S. firms exhibit lower degrees of tax avoidance and attribute this result to the concern of minority shareholders that the founding family will use their control to extract rents.

[2] "Pyramidal ownership structure is defined as an entity whose ownership structure displays a top-down chain of control. In such a structure, the ultimate owners are located at the apex and what follows below are successive layers of firms. A direct result of this pyramidal ownership structure is a separation of ultimate owners' actual ownership and control in firms located at the lower part of the pyramid structure." (Ariffin 2009, p.1)

[3] One limitation of our study is that our sample only consists of corporations, and excludes pass-through entities. We recognize that the pass-through entities are used to avoid taxation (Luna and Murray 2010), and those effects will not be reflected in our findings.

Business groups face similar concerns that the ultimate owner will expropriate wealth from minority shareholders. Cognizant of this threat, minority shareholders discount the price of their shares, giving rise to a loss in value of the business group firm.[4] Thus, business group firms are likely to face similar costs from minority shareholders and forego tax-planning opportunities to avoid the appearance of wealth expropriation.

In addition, business groups are characterized by a separation of cash flow rights from control rights. McGuire, Wang and Wilson (2014) provide evidence that this separation incurs agency costs that increase the firm's tax rate because firm managers are more entrenched and thereby have lower incentives to exert effort to identify tax-planning opportunities. Thus, for business groups, the lower degree of cash flow rights allocated to group-affiliated firms could exacerbate the underlying agency problem, thereby leading to higher effective tax rates or lower tax avoidance.

In summary, we expect business group affiliation to facilitate tax avoidance through the ability of the ultimate owner to shift resources to take advantage of favorable tax laws. However, the tax avoidance activities of business group firms are tempered by the aforementioned non-tax costs. Therefore, the question of whether the business group organizational structure is, on average, associated with greater or less tax avoidance is ultimately an empirical question.

While nontax costs are generally not observable, we expect them to vary systematically with the development of the country's capital markets. In emerging market countries with less developed capital markets and regulatory environments, the risk of expropriation by controlling shareholders is high. Khanna and Rivkin (2001), Khanna and Palepu (2000), Khanna and Yafeh

[4] Studies of business groups in India and Korea find that minority shareholders use market or legal means to protect their interests, thereby passing the value loss from managerial expropriation back to the ultimate owner (Bertrand, Mehta and Mullainathan 2002, Bae, Kang and Kim 2002; Joh 2003; Baek, Kang, and Lee 2006; and Kim and Yi 2006).

(2005), and Gopalan, Nanda and Seru (2007) argue that in emerging markets business groups use their reputation as a bonding mechanism to reduce the price discount by minority shareholders. This suggests that the nontax cost to the ultimate owner that arises from minority price discount is greater in emerging markets than in developed markets. Emerging markets are also characterized by less developed labor markets and less efficient information systems (e.g., Domowitz, Glen, and Madhavan, 1998; Khanna and Palepu, 1999; Morck, Yeung, and Yu, 2000; and Douma, George, and Kabir, 2006). This combination increases the nontax cost to the ultimate owner of monitoring the activities of group firm managers and their ability to identify tax-planning opportunities. In addition, Gallemore and Labro (2015) show that lower-quality information reduces managers' ability and opportunities to identify tax-planning opportunities.

The foregoing discussion suggests that the nontax costs associated with the business group form are likely to be greater in emerging market countries than in developed market countries. Thus, we expect the impact of the business group on tax avoidance to differ across countries, depending on the development stage of a country's economy. Specifically, relative to stand-alone firms, we expect business group firms to exhibit higher degrees of tax avoidance in developed markets where the nontax costs are relatively low than in emerging markets where the nontax costs are relatively high.

To test the relation between business group affiliation and tax avoidance, we construct an international sample of 3,829 group-affiliated non-U.S. firms over the period of 2000–2013 from 38 countries. Following Atwood, Drake, Myers, and Myers (2012), we measure the extent of a firm's tax avoidance by the difference between the country's statutory corporate tax rate and the firm's cash effective tax rate. We use an index constructed by Morgan Stanley Capital International (MSCI) to classify a country as an emerging market or a developed market and use

two variations of our test variable, i.e., business group affiliation. The first is a dichotomous variable that indicates whether the firm is part of a business group and the second indicates whether the firm is part of a large business group that has more than three member firms.

For the full sample, we find that group-affiliated firms display a greater degree of tax avoidance (a lower effective tax rate) than stand-alone firms. When we split the sample between developed and emerging market countries, we find that in developed countries where nontax costs are relatively low, business group firms demonstrate a greater degree of tax avoidance than stand-alone firms. In contrast, in emerging market countries where nontax costs are relatively high, we find that business group firms exhibit a lower degree of tax avoidance than stand-alone firms. These results indicate that the impact of the business group ownership structure on tax avoidance differs across countries and reinforces the importance of nontax costs as determinants of tax avoidance in an international context.

However, when we replace country indicator variables with country-level control variables the coefficient on the group indicator variable in the emerging market sample is not significant. This is partially due to the loss of 25% of the emerging market sample arising from data considerations and could also be attributed to the (time-variant) country-level control variables being correlated with cross-country differences in nontax costs within emerging markets. In contrast, we find that the positive relation between group affiliation and tax avoidance in the developed market sample is robust to using country-level controls.

We also find that the greater degree of tax avoidance by business group firms in developed markets is sensitive to the exclusion of Japan. Japan firms constitute approximately 26% of our full sample and 42% of the developed market sample. When we exclude Japan the positive coefficients on the business group indicator variable in the full sample and developed

market samples are not significant. One possible explanation is that Japan has a code, or civil law legal system. A code law system generally provides minority investors with a lower degree of legal protection than a common law system and could therefore provide ultimate owners with a greater degree of flexibility to shift resources to reduce group firm tax payments. To provide evidence on this issue, we estimate the relation between group affiliation and tax avoidance for firms in developed market, code law countries excluding Japan. We find a significantly positive association, which is consistent with the code law legal system allowing ultimate owners to shift resources and income in order to reduce tax payments of group firms.

Overall, our study contributes to the literature on the determinants of tax avoidance by showing that the organizational structure of the firm combines with country level characteristics to influence the extent of a firm's tax avoidance. Prior studies on tax avoidance have focused on large multinational U.S. corporations (Rego 2003), including studies linking tax avoidance to ownership structure (Chen, et al. 2010; McGuire et al. 2014). We extend the findings of Atwood et al. (2012), who examine the relations between country-level characteristics and tax avoidance, by providing evidence regarding the impact of a common organizational structure, i.e., business group, on tax avoidance and how it varies across country characteristics. We also extend the findings of Luna and Murray (2010) who examine how state tax rates affect the decision to structure a business as a corporation or a pass-through entity in the U.S., by examining the impact of organizational structure on tax avoidance across countries.

Our study also extends the literature on how country-specific conditions influence the economic effects of the business group structure. Mahmood and Mitchell (2004) use cross-country tests to document that the benefits associated with business group affiliation such as the increased access to internal financing and a greater degree of innovation, and Masulis et al.

(2011) illustrate that family-controlled business group structure emerges in order to maintain control, as well as to circumvent external financing constraints. Our study provides evidence that country-level institutional characteristics also impact the tax advantages associated with the business group form.

2. Business Groups and Tax Avoidance

An important strand of literature focuses on the trade-off between nontax costs and cash tax savings (e.g., Scholes, Wilson, and Wolfson 1990). In theory, firms choose an optimal level of tax avoidance that balances tax savings against the associated nontax costs. Thus, while firms generally attempt to take advantage of favorable tax provisions, their ability to do so is limited by the potential costs, or frictions from taking such actions. As a result, the ability of a firm to take advantage of tax planning opportunities depends on the nature of their product markets, production functions, and organizational structure.[5]

Organizational and ownership structures that allow firms to transfer resources and income between taxable units should provide more tax planning opportunities. One such ownership structure is the business group. Khanna and Rivkin (2001, p. 47) describe business groups as "a set of firms which, though legally independent, are bound together by a constellation of formal and informal ties, and are accustomed to taking coordinated action." A business group typically has a pyramidal structure whereby an ultimate owner controls a set of firms, each of which controls another set of firms that creates the wedge between ownership and control rights. This is a fairly common structure that allows capital to flow more efficiently

[5] For example, firms that rely on innovation to generate value are better able to take advantage of R&D tax credits and firms whose values are tied to intellectual property rights are better able to shift incomes from high-tax to low-tax jurisdictions. This suggests that a firm's tax rate depends on its ability to shift income and resources between economic activities or entities.

through different organizations, leading to greater and more effective investments in assets and R&D, particularly when external capital and input markets are not well developed (Almeida and Wofenzen 2006, Masulis et al. 2011, Belenzon and Berkovitz 2010). The control rights of the ultimate owner should also allow her to shift resources among firms affiliated with a business group to take advantage of tax saving opportunities. For example, the owner can direct R&D resources to units that can take full advantage of R&D tax credits or shift income to units that pay lower tax rates. Thus, the business group structure should facilitate the ability of the affiliates to reduce the overall tax payments of member firms.

On the other hand, prior studies illustrate that this ownership structure creates a wedge between voting rights (control) and cash flow rights (ownership). This characteristic can increase costs of tax avoidance in two ways. The first is that the separation of control from cash flow rights incentivizes the ultimate owner to shift resources from organizations for which the owner has low cash flow rights (i.e., those located at the bottom of the pyramid) to organizations for which the owner has high cash flow rights (i.e., those located at the top of the pyramid). This process, referred to as "tunneling," allows the ultimate owner to expropriate wealth from minority shareholders (Bae, Kang, and Kim 2002, Joh 2003, Bertrand, Mehta, and Mullainathan 2002, Baek, Kang, and Lee 2006). Anticipating these actions, minority investors' price-protect themselves from the expropriation by reducing the value to the firm generating a "minority price discount".

The potential market discount associated with the perception that business group firms are transferring resources to reduce their tax payments could lead group firms to forego tax-planning opportunities. Stated another way, group affiliated firms may pass up tax planning activities to convey to outside investors a credible signal that they do not engage in rent

extraction through tax avoidance. In this respect, business group affiliation could serve as a bonding mechanism that helps group affiliated firms to avoid the potential loss in value from minority discounts and reputation losses. This is consistent with the findings reported by Chen et al. (2010), who identify a sample of founding family-run firms in the U.S. and compare their cash effective tax rates against a comparable sample of non-family-run firms. They find that family-run firms pay higher cash effective tax rates than their non-family-run counterparts and attribute this result to family-run firms foregoing tax savings in order to avoid the potential minority shareholder discount from family rent-seeking activities.

A second cost is an effort aversion problem in the standard agency model (Jensen and Meckling 1976). Identifying and exploiting tax savings takes considerable managerial effort and expertise. Thus, managers need to be incentivized in order to spend the effort and resources necessary to exploit tax saving opportunities. The separation of control and cash flow rights, which is a salient characteristic of the business group form, exacerbates this problem by reducing the proportion of the tax savings flowing to the management of group member firms relative to stand-alone firms. McGuire et al. (2014) provide evidence that the separation of control and cash flow rights influences the degree of tax avoidance by examining the relative tax avoidance of dual-class versus single-class ownership firms. They argue that the divergence between control and ownership associated with dual-class ownership structures increases the agency problem and reduces managerial incentives to exert effort to identify tax-saving opportunities. Consistent with this view, McGuire et al. (2014) find that dual-share firms exhibit a lower degree of tax avoidance than comparable single-class firms, and conclude that the separation of ownership from control leads to a lower level of tax avoidance.

Because the incremental degree of tax avoidance associated with the business group organizational form depends on the extent of the non-tax costs, cross-country differences in these costs should influence the trade-off that determines a firm's optimal tax planning and strategy. One such difference is the degree of the development of a country's economic system.

Emerging markets are generally characterized by having less well developed information systems and regulatory regimes. This creates additional opportunities for tunneling activities and increases the concerns that ultimate owners will use their voting rights to extract rents from minority shareholders via the complex ownership structure of the business group. Consistent with this view, there is empirical evidence of minority price discounts in emerging market countries (Bertrand, Mehta and Mullainathan 2002, Bae, Kang and Kim 2002; Joh 2003; Baek, Kang, and Lee 2006; and Kim and Yi 2006).

The weaker regulatory regime and information environment in the emerging market countries also exacerbate the underlying agency problem by making it more difficult (costly) for ultimate owners to monitor managerial actions of group firms. This issue is also likely to be especially problematic with developing highly technical tax avoidance strategies. Managers are generally selected based on their general management skills or technical knowledge for their specific business, as opposed to tax expertise. As a result, absent direct incentives under which they receive a large proportion of the tax savings, they are more likely to focus on tax compliance, as opposed to expending costly effort in developing tax avoidance strategies. Cheng et al. (2012) provide evidence consistent with this view by examining the impact of hedge fund activism on tax avoidance. They find that hedge fund intervention, particularly by hedge funds with specific tax expertise, leads to reduction in firm cash effective tax rates. In addition, the

poor internal information environment in emerging market economies increases the difficulty (cost) of identifying tax-planning opportunities (Gallemore and Labro 2015).

The foregoing discussion leads to the following research questions. First, do ultimate owners use the financial flexibility of the business group ownership structure to reduce the tax liability of group firms? Second, if so, to what degree is the additional tax avoidance offset by the nontax costs associated with the business group structure? To address these questions, we compare the tax avoidance of firms affiliated with business groups to the tax avoidance comparable stand-alone firms for the full sample, and then, separately, evaluate the comparison for emerging market countries, where the nontax costs are expected to be high, and for developed market countries, where the nontax costs are expected to be relatively low.

3. Research design

3.1. Sample and descriptive statistics

We construct our sample from the intersection of Compustat Global (for accounting data) and the Bureau van Dijk (BvD) Osiris database and the Worldscope database (for ownership-related data). BvD collects ownership information from companies, government agencies or associated information providers, such as company registrars of national statistical offices, credit registries, stock exchanges, and regulatory filings. Our sample period covers the 14-year period of 2000–2013. We identify business groups using detailed firm ownership links from the Osiris and Worldscope databases, and merge business group data with accounting data from the Compusat Global database. We define a business group as a group where two or more listed firms are controlled by the same ultimate controlling owner. Control is typically enhanced through ownership pyramids, cross-shareholdings and to a lesser extent dual class shares. To

identify whether a firm has an ultimate controlling owner, we use annual Osiris DVD updates from 2002 through 2013, supplemented by Worldscope.[6] Osiris tracks control by computing voting rights rather than cash flow rights and identifies a shareholder of a firm to be the ultimate owner at a given threshold if that shareholder's stake in the firm exceeds that threshold directly or he controls it via a control chain whose links all exceed that threshold. A shareholder might be a corporation, an individual, a family, a foundation, or a government. In tracing control, Osiris presets the threshold of either 25% or 50% and we choose a 25% threshold.[7] We supplement the Osiris ownership information by manually gathering data on business group attributes from several information sources, including LexisNexis (e.g., the Major Companies Database), Factiva (e.g., the Taiwan Economic Journal database of Asian companies), stock exchange and securities regulator websites (in Argentina, Belgium, Chile, Colombia, India, Indonesia, Italy, and Sri Lanka), directly from company annual reports available in Standard and Poor's Mergent Online database or other online sources (providing a substantial portion of the ownership data collected for firms in Israel, Malaysia, Mexico, Pakistan, Sri Lanka, Singapore, and Thailand), and other online sources, such as Dun and Bradstreet's Who Owns Whom and Thomson Reuters' OneSource.

To ensure that our results are not driven by prior findings with regard to U.S. multinationals, we exclude business groups with U.S. ultimate owners. In addition, because governments receive tax payments, rather than making tax payments, we exclude business groups with governmental bodies, or agencies, as ultimate owners. Data requirements limit our study to publicly traded corporations. While this limits the firms included in business groups by excluding private firms, it ensures that all firms in the sample are subject to corporate taxes.

[6] We extrapolate the ownership structure in 2000 and 2001 based on the 2002 ownership data and validate it by using Worldscope and the ownership data constructed by Faccio and Lang (2002).
[7] We have used various thresholds to define the ultimate owner. Our results remain qualitatively unchanged.

We begin with all firm-year observations having sufficient data in the Compustat Global database to compute the variables used in our empirical analyses and merge them with the business group membership data from the Osiris database. Next, we apply a matching procedure to control for observable differences between group-affiliated firms and stand-alone firms.[8] To address this issue, we use a propensity score matching (PSM) methodology (Dehejia and Wahba, 2002). Details regarding the propensity matching procedure can be found in Appendix C.

We classify countries as being in an emerging or developed market based on the 2015 index constructed by MSCI, an investor research and analysis firm. According to MSCI, emerging market countries have lower degrees of openness to foreign ownership, lower capital inflows/outflows, lower efficiency of operational framework, and less stable institutional framework. Thus, emerging market countries generally have less developed capital markets with limited access to foreign capital. The "efficiency of operational framework" reflects the "level of advancement of the legal and regulatory framework governing the financial market," and the stability of institutional framework includes the "basic institutional principles such as the rule of law and its enforcement."

Our measure of tax avoidance follows Atwood et al. (2012) as the reduction in explicit taxes paid relative to the country's statutory rate. Specifically, tax avoidance (*TaxAvoid*) for firm i in year t is defined as follows:

$$TaxAvoid_{it} = \frac{\left[\sum_{t-2}^{t}(PTEBX*\rho)_{it} - \sum_{t-2}^{t} CTP_{it}\right]}{\sum_{t-2}^{t} PTEBX_{it}} \quad (2)$$

where:

PTEBX	=	pre-tax earnings before exceptional items (*PI–XI* or Item 21–Item 57);[9]

[8] Business groups could engage in "winner-picking" by identifying profitable stand-alone firms (Belenzon and Berkovitz 2010).
[9] Item numbers reference the Compustat Global FTP database.

ρ	=	home-country statutory corporate income tax rate;[10] and
CTP	=	current taxes paid (*TX*–the change in *TXP* or Item 24–the change in Item 1000).[11]

Our measure indicates that a higher value of *TaxAvoid* reflects the amount of actual tax paid below the amount of statutory corporate tax to be paid under the current tax law.

[Insert Table 1 about Here]

Panel A of Table 1 provides the number of firms and firm-year observations for stand-alone firms and group-affiliated firms by country. The table also provides the market classification for each country. Japan is the country that has the largest representation with 27.12% (23.40%) of the stand-alone (group-affiliated) firm-year observations.

Panel B of Table 1 provides data regarding the ownership by the ultimate owner (at the firm level) and the number of firms in each business group. We impose a minimum ownership of 25%. The mean (median) ownership is 67% (60%). The mean (median) number of affiliates in a business group is 4 (2) firms. However, our sample is highly skewed with several large business groups. At the firm level, which is our level of analysis, larger business groups have greater representation, which leads to a mean (median) of 8 (3) firms from each business group.

[Insert Table 2 about Here]

Table 2 presents the data separated by the business-group ownership structure. Panel A of Table 2 reports the distribution of firms by industry (Campbell 1996). We find a relatively high representation of firms in the Services and Leisure industries. Panel B of Table 2 presents the

[10] We hand-collected these statutory rates from a KPMG LLP online summary, PricewaterhouseCoopers LLP's online information, and Coopers & Lybrand LLP's worldwide tax summary guides.
[11] When current tax expense (*txc*) is missing, we replace it with total tax expense less deferred taxes (*txt-txdI*) when available. We delete observations where current tax expense (*txc*) is missing and either total tax expense (*txt*) or deferred taxes (*txdI*) is missing.

summary statistics for the variables used in our analysis separately for stand-alone firms and group-affiliated firms.[12] We find that the level of tax avoidance, captured by *TaxAvoid,* is higher for group-affiliated firms (median = 8.2%) than for stand-alone firms (median = 7.7%). Though only suggestive of the underlying relation, this univariate finding is in line with the view that group-affiliated firms tend to engage in higher levels of tax avoidance than stand-alone firms.

3.2. *Empirical model*

We use the following baseline model to test for the effect of the group affiliation on tax avoidance conditional on a country's economic development:

$$TaxAvoid_{it+1} = \beta_0 + \beta_1 Group_{it} + \Sigma\beta_n Z_{it} + \alpha_{Year} + \gamma_{Industry} + \eta_{Country} + \varepsilon. \qquad (3)$$

where $TaxAvoid_{it+1}$ is the tax avoidance measure from Equation (2); and $Group_{it}$ is an indicator variable that equals one if the firm belongs to a business group and zero otherwise; Z_{it} is a vector of firm-level controls; and α_{Year}, $\gamma_{Industry}$, and $\eta_{Country}$ are indicator variables for the year, Fama-French 48 industry, and country, respectively. Following Atwood et al. (2012), we include a set of firm-level controls, including pre-tax return on assets [*Pre-Tax ROA*], firm size [*LogSize*], cash size [*CashSize*], research and development expenditures [*R&D*], capital structure [*Lev*], sales growth [*SalesGrowth*], asset mix [*CapInt* and *InvInt*], firm age [*FirmAge*] and an indicator variable for multinational operations [*Multi*]. We also include variables representing other ownership structure characteristics of firms that include the dual-class structure [*Dual*] and the family ownership [*FamilyFirm*] (e.g., Chen et al. [2010]; McGuire et al. [2014]).

4. Empirical results

4.1. Full Sample Test

[12] Note that the propensity score matching was based on the values of variables as of the IPO date. We use firm-level controls in our regressions to control for differences across samples in the current values of the financial variables.

We first examine the general relation between business groups and tax avoidance. Column 1 of Table 3 reports the results using OLS estimation. The coefficient on the business group indicator variable (0.003) is significantly positive (t-statistic = 2.21). This result suggests that, on average, business group firms are able to avoid a greater amount of taxes than stand-alone firms and that the expected cash tax savings from tax planning opportunities provided by the business group structure exceed the nontax costs associated therewith.

Columns 2 and 3 of Table 3 present results using a two-stage instrumental variable approach. We estimate the first-stage model by using the Compustast Global universe and then use our sample firm-year observations for the second-stage estimation. In the first stage, group membership is the dependent variable and the control variables include the set of explanatory variables from the tax avoidance regression and a set of instruments to address the self-selection issue. We follow prior studies and use two identification strategies in selecting a set of instruments that are predicted to be associated with group affiliation, but not with the unexplained components of tax avoidance (Belenzon and Berkovitz 2010; Masulis et al. 2015).

We use a firm-level instrument, *Idiosyncratic Risk*, and three separate industry-level (three-digit SIC) instruments capturing R&D intensity [*RD_Intensity*], the level of dependence upon external capital [*ExternalFinance*] and firms' market power [*LernerIndex*] (Belenzon and Berkovitz 2010). Idiosyncratic risk is a popular instrument for ownership structure in prior studies (e.g., Himmelberg, Hubbard, and Palia 1999; Villalonga and Amit 2006 and; Masulis et al. 2015). Idiosyncratic risk could be related to the likelihood of group membership because a controlling party can diversify their exposure to firms with high firm-specific risk, but should not be directly related to a firm's tax avoidance (Guenther, Matsunaga, and Williams 2015). Business groups are more likely to occur in R&D-intensive industries, since groups facilitate

research and development projects through their ability to provide their affiliates with lower cost financing. Groups are also expected to be more prevalent in industries with higher dependence on external financing. We follow Rajan and Zingales (1998) and rank industries according to their dependence on external financing, using U.S. firms from Compustat America.[13] Using the U.S. firms in our setting is advantageous because business groups are rare in the United States due to higher tax and regulatory costs of maintaining a business group (La Porta et al. 1999; Masulis et al. 2015). We compute *External Finance Dependence* as the ratio of capital expenditures minus cash flow from operations to capital expenditures.[14] We also employ the Lerner index as a proxy for the firms' market power, e.g., the ability of a firm to profitably raise the market price of a good or service over marginal cost. Finally, group membership can be related to historical market conditions around a firm's listing date. Stand-alone firms are more likely to go public when capital market conditions are favorable (to raise more cash proceed from external capital markets and finance their investment projects) than affiliates (firms that belong to the business group), given that the affiliates can receive funding from other affiliates within the same group or the group headquarters for their investment projects (Masulis et al. 2011). We employ the cumulative return on the domestic stock market index in the listing year of each firm as an instrument (*Index Return at Listing*).

To validate our choice of instruments we follow Larcker and Rusticus (2010) and conduct weak instrument identification and Hausman specification tests. The partial R^2 of the

[13] Rajan and Zingales (1998) argue that using U.S. firms is advantageous in three ways: (i) Because U.S. firms face low market frictions in attaining external financing, the amount of external financing used by U.S. companies is a strong proxy for their demand for external finance. (ii) Disclosure requirements imply that data on external financing are wide-ranging. (iii) While using U.S. industry data is exogenous to our sample firms across countries, it is likely that an industry's dependence on external funds in the United States is a reasonable proxy for external dependence in our sample countries.

[14] When we use the ratio of the net amount of equity issued to capital expenditures as a proxy for the level of the external capital dependence, the results are qualitatively the same.

first stage regression is 9.2% and partial F is 141.12. The Cragg-Donald Wald F statistic is 35.28, which exceeds the 10% (25%) critical value of 26.87 (15.09) based on Stock and Yogo (2005). Overall, the results suggest that the instrument passes the weak instrument tests by explaining a significant amount of the *GROUP*. The Hausman test yields a Wu-Hausman F value of 3.77 ($p < 0.05$). This test supports the contention that the instrumental variable improves the specification over the OLS estimation.

The results in Column 3 of Table 3, though slightly weaker, are generally consistent with the OLS estimation. The coefficient for the probability of group affiliation is significantly positively associated with tax avoidance (t-statistic = 1.96). Thus the two-stage model lends further support to the conclusion that group-affiliated firms exhibit a greater degree of tax avoidance than stand-alone firms.

[Insert Table 3 about Here]

4.2. Developed vs. Emerging Markets

To provide additional insight into the trade-off between the tax avoidance flexibility and nontax costs of the business group ownership structure, we separately examine the impact of the business group structure on tax avoidance for countries with developed markets and countries with emerging markets. We present the OLS results in Table 4. We report the results for the tests on our developed market country sample in column (1) and our emerging market country sample in column (2).

The results for the developed market countries are stronger than the results for the full sample reported in Table 3. The coefficient on the business group indicator variable increases from 0.003 for the full sample to 0.008 for the developed market countries and is significantly positive (t-statistic = 3.29). This is consistent with nontax costs being relatively low in developed

economies, thereby allowing the business group ownership structure to allocate resources to take advantage of favorable tax provisions.

In contrast, the results for the emerging market countries are not consistent with the findings for the overall sample. Column (2) shows that for emerging markets the coefficient on the business group indicator is negative (-0.004) but is only marginally significant (t-statistic = -1.86). The negative coefficient on the group indicator variable in the emerging market countries, relative to the significantly positive coefficient for the business group variable in the developed market countries, is consistent with the view that the nontax costs of tax avoidance for business group firms are higher in emerging market countries than in developed market countries. Thus, these results provide evidence that the higher nontax costs of emerging market countries constrain the ability of ultimate owners to direct resources to take full advantage of tax avoidance opportunities. To assess the economic significance of the results, note that the median tax avoidance is 0.077. The difference in tax avoidance between the business group coefficients between the developed an emerging market samples, of 0.012 represents approximately 15% of the median tax avoidance.

[Insert Table 4 about Here]

5. Additional Tests

5.1 Using a Large Group Indicator Variable

As noted above, a business group in our sample includes at least two affiliated firms. It is not clear whether this arrangement would provide the ultimate owners with sufficient flexibility to shift resources to reduce the tax liability. We therefore define a large group indicator that is equal to one if the firm is part of a group of more than three firms and zero otherwise. To maintain our propensity score matches, we exclude firms in business groups with one or more

firms and their matches. Therefore our sample is limited to firms in large business groups and their propensity score matched stand-alone firms. As shown in Table 1, the median group size in our sample is three at the firm level. We report the results in Table 5. The results suggest that large groups are better able to shift resource to reduce their tax liability.

Specifically, we find that the coefficient on the large group indicator for the overall sample of 0.007 is greater than the coefficient of 0.003 for the group indicator variable from Table 3. We also find that, in the developed market sample, the coefficient for the large group indicator of 0.011 is greater than the coefficient of 0.008 for the group indicator in Table 4 and the coefficient for the large group indicator in the emerging market sample of -0.001 is greater than the coefficient for the group indicator in the emerging market sample of -0.004 reported in Table 4. This evidence supports the contention that larger groups are better able to reduce the tax liability for member firms in developed markets, but not in emerging markets.

[Insert Table 5 about Here]

5.2 Changes in business group affiliation

To further alleviate concerns about correlated omitted variables and reverse causality, we next estimate a change regression by examining how becoming a part of a business group through the mergers and acquisitions process relates to changes in a firm's tax avoidance. We identify acquisitions from the SDC Platinum database. The dependent variable is the change in tax avoidance (tax avoidance year t+1 less tax avoidance year t-1). Our test variable is an indicator variable equal to one if the firm was acquired by a business group, and zero otherwise. The coefficient on this variable captures the change in tax avoidance associated with being acquired by a business group versus other types of mergers and acquisitions. We then estimate the regressions on the smaller sample (N = 2,561 for developed market, 1,043 for emerging

market, respectively). In the regression we also include changes in the same firm-level controls from year t-1 to year t+1.

Table 6 presents the results. We find a significantly positive coefficient on the group variable for the full sample (coefficient = 0.009, t-statistic = 1.69) and the developed market sample (coefficient = 0.017, t-statistic = 2.31). However, the coefficient in the emerging market sample is not significant at conventional levels (coefficient = -0.008, t-statistic =-0.67). In short, the findings in Table 6 show that the degree of a firm's tax avoidance increases after they become a member of a business group in developed markets, but not in emerging markets, and thus reinforce our earlier results.

[Insert Table 6 about Here]

5.3 Controlling for country characteristics

In prior tests, we use country indicator variables to control for tax levels for each country. This approach also has the advantage of capturing any unobservable time-invariant country-specific factors that affect the level of tax avoidance without imposing a common linear relation between the country-specific variables and the average level of tax avoidance in a given country. An alternative approach is to use country-level control variables (Atwood et al. 2012).[15] To this end, we now replace country indicators with seven country-level controls, that is: (i) the level of required book-tax conformity [*BTaxC*]; (ii) an indicator for countries with a worldwide approach [*WW*] to tax foreign income; (iii) the tax evasion index [*TaxEnf*] to capture perceived tax enforcement; (iv) the statutory corporate tax rate in the home country [*TaxRate*] to capture the impact of tax system characteristics on tax avoidance; (v) the average of variable pay as a percentage of total compensation for firms in the country [*VarComp*] to capture management incentives for tax avoidance (Phillips 2003; Rego and Wilson 2012; Hanlon and Heitzman

[15] We provide detailed descriptions of the calculation of the country-level controls in Appendix B.

2009); (vi) the cross-sectional earnings volatility [*Earnvol*] to control for differences in the cross-sectional variance in pre-tax earnings; and (vii) the country's legal factor

We present the results with the above country-level controls in Table 7. We continue to find significantly positive coefficients for the group indicator variable in the overall sample and developed market sample. However, the coefficient on the group indicator variable in the emerging market sample is not significant. One reason for the drop in significance is the loss in the number of observations due to the additional country-level data required by this test. This is especially problematic in the emerging market sample. In the developed markets, the sample size drops from 40,951 to 37,887 (8%), while in emerging markets the sample size drops from 25,626 to 19,157 (25%).[16] To provide evidence on this issue, we estimate the regression after replacing the country level variables with country indicators, using the same sample in Table 7. The results (not reported) indicate that the coefficient on the group indicator variable in the emerging market sample is not significant (t-statistic = -1.06), which suggests that the loss in power from the smaller sample partially explains the insignificant result reported in Table 7.[17] In addition, it is likely that the measures such as variable compensation and earnings volatility could be correlated with cross-country differences in nontax costs.

[Insert Table 7 about Here]

5.4 Excluding Japan

[16] The emerging market countries without sufficient country level data are Chile, Colombia, Indonesia, Peru, the Philippines, Poland, Thailand, and Turkey.

[17] When we use a similar procedure for the developed market sample, the coefficient on the group variable remains significantly positive (t-statistic = 2.74).

Firms from Japan make up a substantial portion of our sample. As a result, it is possible that our results are driven by Japan and do not generalize more broadly. We therefore conduct our analyses after excluding Japan and report the results in Table 8.

We find that our results are not robust to the exclusion of Japan. For the overall sample and the developed market sample, when we exclude Japan, the coefficients on the group and large group indicator variables decline and are no longer significant. Therefore the positive relation between business group affiliation and tax avoidance in developed market countries is sensitive to the exclusion of Japan. This result suggests that our prior finding that business group membership allows firms to increase their tax avoidance may not generalize to developed countries outside of Japan.

[Insert Table 8 about Here]

One reason for the apparent impact of Japan on the empirical relation between group membership and tax avoidance is that Japan has a code law legal origin, while several other developed market countries, such as Australia, Great Britain and Singapore have a legal system based on English common law. The legal origin should fundamentally shape each country's tax laws as well as firms' relationships with stakeholders such as governments, lending banks and their employees (Ball et al. [2000]). English common law protects outside minority investors more effectively than code law by making it easier for minority shareholders to obtain relief through the legal system (La Porta et al. 1998, 2002: Claessens et al. 2002; Dyck and Zingales 2004; Leuz et al. 2003).[18] In addition, the investor protection associated with common law allows investors to more effectively monitor and constrain management behavior. This is consistent

[18] Private control benefits include opportunities to engage in tunneling, self-dealing, perquisite consumption, empire building, and the expropriation of corporate growth opportunities (Grossman and Hart 1980; Barclay and Holderness 1989; Shleifer and Vishny 1997; La Porta et al. 1998, 1999; Johnson et al. 2000; Nenova 2003; Dyck and Zingales 2004; Djankov et al. 2008).

with the finding of prior research (e.g., Leuz, et al. 2003; and Ball, et al. 2000) that common law is associated with higher earnings quality. Thus a common law legal system could inhibit ultimate owners from pursuing aggressive tax strategies that could lead minority shareholders to suspect rent extraction.

Therefore, excluding Japan from the sample removes a substantial number of observations from code law countries and increases the proportion of the sample drawn from common law countries where the opportunities for business groups to shift income are limited by minority shareholder legal protections. To provide evidence on this issue we estimate our regression on a sample of developed market, code law countries, excluding Japan.[19] We report the results for the group and large group indicator variables in the last two columns of Table 8. We find significantly positive coefficients for both group indicator variables. This evidence supports the contention that the legal protections provided by common law legal systems deter ultimate owners from shifting resources and income in order to reduce tax payments of group firms in developed market countries.

5.5. Determinants of the Extent of Business Group Tax Avoidance

To provide additional insight into how the nontax costs impact tax avoidance for business group firms, we conduct tests on the extent of tax avoidance within our business group sample (excluding stand-alone firms) and report the results in Table 9. Panel A reports the findings for the full sample and Panel B shows the findings separately for the developed and emerging markets. For brevity, we suppress the presentation of the results for the firm-level controls.

[19] The countries are Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland.

Our first variable is the extent of the ultimate owners' direct ownership. We find that ultimate owners' direct ownership is negatively associated with firms' tax avoidance behavior in the full sample (Panel A) and in emerging market countries (Panel B). This result is in line with the view that an increase in the ultimate owners' direct ownership increases the nontax costs, particularly, price discounts by minority shareholders that are more severe in emerging market countries, leading to a lower degree of tax avoidance.

Our second variable is the percentage of foreign sales revenue. We find a significantly negative relation between the percentage of foreign sales and tax avoidance in the full sample (Panel A) and in emerging market countries (Panel B). This suggests that among business group firms, firms that generate a higher proportion of revenue from foreign sources tend to exhibit a lower degree of tax avoidance. While this finding is contrary to findings based on U.S. multinationals, we note that the U.S. tax rate is generally higher than foreign tax rates, and U.S. companies often invest in tax haven countries. In contrast, the tax rates in emerging market countries (see Table 2) could be below the rates paid by affiliated firms operating outside the domestic market.

[Insert Table 9 about Here]

Our third variable identifies whether a group is vertically structured (a.k.a. pyramidal structures) or horizontally structured. A horizontal integration indicates an organization that consists of similar firms in the same industry. A vertically integrated structure, whereby a firm develops its business operations into different steps on the same production path (e.g., when a manufacturer owns its supplier and/or distributor), may facilitate the transfer of corporate resources between different layers of the pyramidal structure to reduce their tax payments. We find that while it is insignificant in the developed market sample, the coefficient on "Vertical" is

positive and significant (at the 10% level) in the emerging market sample, which is consistent with vertically structured business groups displaying a greater degree of tax avoidance than horizontally structured groups in emerging market countries.

6. Summary and conclusion

In this paper we investigate how the business group ownership structure and country-level characteristics combine to influence the degree of a firm's tax avoidance. The ability of a business group to access and control the distribution of capital and resources across group affiliates should allow business group firms to better take advantage of tax planning opportunities, but at the cost of increasing nontax costs.

We use the Osiris and Worldscope databases to identify firms as being affiliated with a business group, and the MSCI Emerging Markets Fund to identify emerging market countries. Our sample period covers the 14-year period of 2000–2013.

On average, we find that business group firms exhibit more tax avoidance than stand-alone firms. This suggests that ultimate owners are able to use their financial flexibility and control to allocate resources to reduce their tax liability and overcome the associated nontax costs. We also find that this result is concentrated in developed market countries. In emerging market countries we find that business group firms exhibit less tax avoidance than stand-alone firms. This is consistent with emerging market countries having larger nontax costs that inhibit their ability to reduce their tax payments.

However, we find that the negative relation between tax avoidance and group affiliation in emerging markets becomes insignificant if we replace country-specific indicator variables with country level controls. In addition, we find that the positive relation between business group

affiliation and tax avoidance in developed markets is sensitive to the exclusion of Japan. In subsequent tests we find that the positive relation between the two holds generally for business groups in developed market countries with a code law system, which suggests that investor protection provided by a common law legal system deters owners from shifting resources to avoid taxes for group firms.

Overall, although our findings are not conclusive, they suggest that the relation between business group affiliation and tax avoidance is a complicated issue and is conditional on the costs of shifting income. Therefore, further work on other conditions that affect the relative tax avoidance of business group firms in various countries could yield interesting insights. Specifically identifying stronger measures of specific nontax costs could provide further information on how a country's characteristics impact the influence of organizational structure in shaping corporate tax planning and strategy.

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APPENDIX A
Variable Definitions

Variables of interest		
Group	=	An indicator variable that equals one if a firm belongs to a business group. A business group is defined as a set of firms owned by the same ultimate owner. We define a shareholder of a firm to be the ultimate owner if that shareholder's stake in the firm exceeds 25 percent directly or via a control chain whose links all exceed 25 percent. (Source: Bureau van Dijk and Worldscope).
Large Group	=	An indicator variable that equals one if a firm belongs to a business group witj more than three firms. (Source: Bureau van Dijk and Wordscope).
TaxAvoid	=	 where: PTEBX = pre-tax earnings before exceptional items ($PI - XI$); = home-country statutory corporate income tax rate; and CTP = current taxes paid (TXC – the change in TXP). (Source: Compustat Global).
Ultimate Owners' Cash Flow Right	=	The direct ownership of the ultimate owner in percentage. (Source: Bureau van Dijk and Worldscope).
PctForeignSales	=	The ratio of foreign sales to total sales (Source: Compustat Global).
Vertical	=	An indicator for a business group where the controlling shareholder holds both direct and indirect stakes in affiliated firms. (Source: Bureau van Dijk and Worldscope).
Firm-level control variables		
Pre-Tax ROA	=	Pre-tax income before exceptional items ($PI - XI$) divided by lagged total assets (AT). (Source: Compustat Global).
Size	=	The natural log of total assets (AT). Source: Compustat Global.
CashSize	=	Cash and Short-Term Investments (CHE) divided by lagged total assets (AT). Source: Compustat Global.
R&D	=	Research and development expense (XRD) divided by lagged total assets (AT). Source: Compustat Global.
Lev	=	Total long-term liabilities ($DLC + DLTT$) divided by total assets (AT). Source: Compustat Global.
SalesGrowth	=	The three-year average change in sales ($SALE$). Source: Compustat Global.
CapInt	=	Net property plant & equipment ($PPENT$) divided by total assets (AT). Source: Compustat Global.
InvInt	=	Inventory ($INVT$) divided by total assets (AT). Source: Compustat Global.
FirmAge	=	The number of years after a given firm's initial public offering. Source: SDC Platinum and Compustat Global.
Multi	=	An indicator variable which equals zero if foreign income taxes is missing or zero, and equals one otherwise.
Idiosyncratic Risk	=	The standard error from estimating the one-factor market model on each firm's monthly stock returns in the five years prior to 2002.

		Source: Compustat Global.
Index Return at Listing	=	The annual market index return in the year of a firm's listing. Sources: Datastream and SDC Global Issue.
Dual	=	An indicator variable that equals one if the firm has dual-class shares. Sources: Data Stream, CRSP and National Stock Exchange Documents.
FamilyFirm	=	An indicator variable which equals zero if the type of direct ultimate ownership is "Individual(s) or family(ies)" or "One or more named individuals". Source: Osiris.
Industry-level control variables		
RD_Intensity	=	R&D Intensity computed as the average three-digit SIC level for the period 2000-2013 based on Compustat firms. . R&D intensity is the ratio between R&D expenditures and sales.
ExternalFinance	=	External Finance Dependence is the ratio between capital expenditures minus cash flow from operations and capital expenditures.
LernerIndex	=	Lerner Index of Competition is based on U.S. firms and is computed as the three-digit industry average of 1 minus profits over sales for the period 2000–2013.
Country-level control variables		
BtaxC	=	The level of book-tax conformity from Atwood et al. (2012)
WW	=	A dummy variable, which takes on the value of one for firms in home countries with a worldwide approach, and the value of zero for firms in home countries with a territorial approach;
TaxEnf	=	Managers' perceptions of the strength of tax enforcement in the country, from the 1996 World Competitiveness Report
TaxRate	=	The statutory corporate tax rate in the home country (Sources: a KPMG LLP online summary, PricewaterhouseCoopers LLP's online information, and Coopers & Lybrand LLP's worldwide tax summary guides)
VarComp	=	The country average of managers' variable pay as a percentage of management compensation (Source: Towers Perrin 2005)
Earnvol	=	The scaled descending decile rank of cross-sectional pre-tax earnings volatility by country-year
CommonLaw	=	An indicator variable that equals one if the country has a common law origin. (Source: La Porta et al. 1998)
Emerging	=	An indicator variable that equals one if the country is classified as an emerging capital market. (Source: MSCI emerging markets fund)
LegalFactor	=	Institutional factors (Factor) using the results of a factor analysis of the country's legal tradition (common law versus code law), strength of investor rights, and ownership concentration as developed by La Porta et al. (1998).

APPENDIX B
Measures of Country-Level Tax Characteristics from Atwood et al. (2012)

We use the four proxies for country-level tax characteristics from Atwood et al. (2012). *BtaxC* is a proxy for required book-tax conformity. Atwood, Drake and Myers (2010) develop this measure by computing the conditional variance of current tax expense (*CTE*) for a given level of pre-tax book income (*PTBI*) in a given country-year (i.e., Var(*CTE*|*PTBI*)). Countries with a lower conditional variance are assumed to have less flexibility in tax planning activities for a given level of reported pre-tax earnings, thereby requiring higher required book-tax conformity. That is, *CTE* is a proxy for the required level of book-tax conformity in the firm's home country. Specifically, Atwood et al. (2010) measure the conditional variance of current tax expense from the following model, which is estimated by country-year:

$$CTE_t = h_0 + h_1 PTBI_t + h_2 ForPTBI_t + h_3 DIV_t + e_t \quad (4)$$

CTE is current tax expense (Item #23 – Item #25); *PTBI* is pre-tax book income (Item #21); *ForPTBI* is estimated foreign pre-tax book income (foreign tax expense (Item #51)/total tax expense (Item #23) * PTBI); DIV is total dividends (Item #34); and e is the error term. We scale all variables by average total assets (Item #89). *BtaxC* is computed as the ranking of the root mean squared errors (RMSEs) from the equation (4). Countries with higher rankings of RMSEs in a given year have higher required book-tax conformity.

The second control is an indicator variable (*WW*) for firms domiciling in home countries that use a worldwide approach to taxing foreign income as opposed to taking a territorial approach (Attwood et al. 2012). These data are extracted from PricewaterhouseCoopers Corporate Taxes: A Worldwide Summary guides and from the Ernst & Young Worldwide Corporate Tax Guide for years 1990 through 2008. These guides document the percentage of dividends from foreign subsidiaries that are subject to tax. We categorize countries as territorial if they exempt from tax at least 75 percent of foreign subsidiary dividends. The level of tax avoidance is expected to be lower when countries adopt the worldwide approach to taxing foreign income.

TaxEnf is a proxy for perceived tax enforcement. Following Attwood et al. (2012), we use the tax evasion index from the 1996 World Competitiveness Report, which is constructed based on a survey of more than 2,000 business executives per country. Respondents answer their agreement with the statement ''Tax evasion is minimal in your country'' on a scale from one through six (where one denotes strongly disagree and six denotes strongly agree). Therefore, higher numbers suggest that tax enforcement is considered to be stronger. Attwood et al. (2012) predicts that the association between tax avoidance and *TaxEnf* will be negative. Finally, the statutory corporate tax rate is included as a significant control variable capturing the impact of tax system characteristics on tax avoidance. As a general rule, the benefits of engaging in tax avoidance are predicted to be greater when the statutory tax rate is higher. Following Attwood et al. (2012), we collect the statutory corporate tax rates (*TaxRate*) from a KPMG LLP online summary, PricewaterhouseCoopers LLP's online information, and Coopers & Lybrand LLP's worldwide tax summary guides.

APPENDIX C
Propensity Score Matching

We use the following logistic regression model to predict the business group affiliation:

$$\text{Prob}(\text{Group}_{i,t}=1) = \alpha + \beta_1 \ln(\text{Total Assets})_{I,t-1} + \beta_2 \ln(\text{Cash Flow})_{i,t-1} + \beta_3 \text{ROA}_{i,t-1} + \beta_4 \ln(\text{Firm Age})_{i,t-1} + \beta_5 \text{R\&D Intensity}_{i,t-1} + \beta_6 \text{External Finance Dependence}_{i,t-1} + \beta_7 \text{Lerner Index of Competition}_{i,t-1} + \gamma_{\text{Year}} + \eta_{\text{Country}} + \varepsilon \quad (1a)$$

Prob(Group=1) is equal to one for a group firm, and zero otherwise; *ln(Total Assets)* is the natural logarithm of a firm's total assets; ln(*Cash Flow)* is the natural logarithm of cash flow from operating activities; *ROA* is net income divided by total assets; ln(Firm *Age*) is the natural logarithm of the number of years since the date of incorporation. *R&D Intensity*, *External Finance Dependence* and *Lerner Index* are computed as their average values for each of Campbell (1996) industries using Compustat North America firms. *R&D intensity* is the ratio of R&D expenditures to sales. *External Finance Dependence* is capital expenditures less cash flow from operations divided by capital expenditures. *Lerner Index of Competition* is computed as the Campbell (1996) industry average of 1 minus profits over sales estimated. We measure all variables at the year of firms' initial public offering. We estimate Equation (1a) using all firms included in Compustat Global with sufficient data.

Panel A reports the estimation results for Equation (1a). Equation (1a) is a strong predictor of the business group affiliation as reflected in high proportion of concordant pairs (87.1%) and low proportion of discordant pair (12.9%). The results suggest that firms with greater profitability and larger size have a higher probability of affiliation. These findings are generally consistent with the winner-picking view whereby groups identify firms with higher expected profitability. Business groups are more prevalent in industries with higher R&D intensity and external finance dependence. This is consistent with the view that the group structure fosters R&D activity through internal financing (Rajan and Zingales 1998; Belenzon and Berkovitz 2010).

We match each affiliate to the four stand-alones domiciled in the same country whose propensity score distance is closest to that of the affiliate with replacement. Panel B provides the standardized differences in our control variables between group-affiliated and stand-alone firms. The results suggest that the procedure is effective in removing most of the differences between the two samples. However, a few differences, most notably firm size, remain.

Panel A: Logistic regression results on probability of business-group affiliation

Variable	**Coefficient (p-value)**
Firm characteristics:	
ln(Total Assets)	0.085***
ln(Cash Flow)	0.003***
ROA	0.000***
ln(Firm Age)	0.013***
Industry characteristics:	
R&D Intensity (R&D/Sales)	6.772***
External Finance Dependence	2.679***

Lerner Index of Competition	2.479***
N	119,694
Pseudo R^2	0.07
Percent concordant	87.1
Percent discordant	12.9

Panel B: Covariate balance—Standardized difference between affiliates and stand-alones

Variable	**Standardized Diff.**
Dual	0.100
FamilyFirm	0.050
Pre-Tax ROA	-0.047
Size	0.519***
CashSize	-0.108*
R&D	-0.072
Lev	0.092
SalesGrowth	0.007
Multi	-0.085
bTaxC	-0.229**
WW	-0.145*
TaxEnf	-0.159*
TaxRate	-0.134*
VarComp	-0.027
Earnvol	-0.047
LegalFactor	-0.250

Panel A reports coefficient estimates from estimating a logistic model to predict business group affiliation. Panel B reports the standardized differences between group firms and the matched stand-alone firms for covariate balancing. Standardized differences of 0.2, 0.5, and 0.8 correspond to small, medium, and large differences between the treatment sample and the control sample, respectively (Cohen 1988). ***, ** and * indicate significance at the 0.2, 0.5, and 0.8 level, respectively. The dependent variable, Group, is equal to 1 if a firm belongs to a business group, and 0 otherwise. Independent variables include ***ln(Total Assets)***, a natural logarithm of a firm's total assets, and ***Cash Flow***, cash flow from operating activities. ***ROA*** is profits over total assets. ***Age*** is the number of years since the date of incorporation. ***R&D Intensity***, ***External Finance Dependence*** and ***Lerner Index*** are computed as the average Campbell (1996) industry level for the period 2000–2013 based on Compustat North America firms. ***R&D intensity*** is the ratio between R&D expenditures and sales. ***External Finance Dependence*** is the ratio between capital expenditures minus cash flow from operations and capital expenditures. ***Lerner Index of Competition*** is computed as the Campbell (1996) industry average of 1 minus profits over sales for the period 2000–2013. All regressions include a complete set of country and year dummies. The sample period spans 2000 to 2013, containing firms affiliated with the business group and stand-alone firms during this period. Only firm-year observations at the IPO year are included in the sample. Robust standard errors are estimated and are clustered at the firm level.

Table 1 Sample Firms

Panel A: Distribution by Country

		Stand-alone Firms		Group-affiliated firms	
Country	**Economy**	Firms	Firm-years	Firms	Firm-years
Australia	Developed	199	1,211	89	536
Austria	Developed	27	148	14	100
Belgium	Developed	43	307	26	214
Brazil	Emerging	99	685	75	466
Canada	Developed	40	222	37	67
Chile	Emerging	67	546	64	514
Colombia	Emerging	2	5	3	14
Denmark	Developed	47	360	20	159
Finland	Developed	48	424	22	99
France	Developed	227	1,742	145	1,053
Germany	Developed	232	1,582	139	893
Greece	Emerging	73	476	45	222
Hong Kong SAR	Developed	228	1,535	90	639
India	Emerging	660	5,271	279	1,872
Indonesia	Emerging	102	497	60	252
Ireland	Developed	8	60	4	33
Israel	Developed	118	541	92	400
Italy	Developed	65	420	54	364
Japan	Developed	1,671	12,253	816	5,010
Korea, Republic of	Emerging	301	1,484	240	1,239
Malaysia	Emerging	257	1,669	130	856
Mexico	Emerging	53	401	26	126
Netherlands	Developed	63	464	37	287
New Zealand	Developed	9	73	4	28
Norway	Developed	53	304	36	180
Peru	Emerging	42	297	38	304
Philippines	Emerging	40	217	51	349
Poland	Emerging	107	615	58	327
Portugal	Developed	11	93	9	60
Singapore	Developed	218	1,399	99	616
South Africa	Emerging	121	807	81	525
Spain	Developed	53	455	38	301
Sweden	Developed	132	916	63	435
Switzerland	Developed	85	702	50	363
Taiwan	Emerging	470	2,749	194	1,007
Thailand	Emerging	95	716	46	298
Turkey	Emerging	99	452	75	369
United Kingdom	Developed	439	3,068	166	833
Total		6,604	45,166	3,515	21,410

Panel B: Business group ownership structure

	Mean	Median	Q1	Q3
Direct ownership by the ultimate owner	0.67	0.60	0.39	1.00
Number of affiliated firms (Business group level)	4.53	2.00	2.00	4.00
Number of affiliated firms (Firm Level)	8.28	3.00	2.00	7.00

This table displays information regarding the stand-alone and business-group affiliated firms in our sample. Panel A provides the number of firms and firm-years by country and each country's classification. For each business group, Panel B provides the percentage of direct ownership by the ultimate owner, and the number of affiliated firms for each business group and the number of firms in the sample affiliated with a given business group.

Table 2 Sample Descriptions

Panel A: Sample distribution by industry

Industry (Campbell 1996)	Stand-alone Firms			Group-affiliated firms	
	Firm-years	%		Firm-years	%
Basic industry	465	1.03		461	2.15
Capital goods	5,678	12.57		2,030	9.48
Construction	99	0.22		61	0.28
Consumer durables	2,243	4.97		1,111	5.19
Finance & real estate	5,524	12.23		1,656	7.73
Food & tobacco	1,295	2.87		1,605	7.5
Leisure	6,714	14.87		3,406	15.91
Others	383	0.85		533	2.49
Petroleum	3,081	6.82		1,846	8.62
Services	9,568	21.18		3,862	18.04
Textiles & trade	1,782	3.95		988	4.61
Transportation	3,864	8.56		2,337	10.92
Utilities	4,470	9.9		1,514	7.07
Total	45,166	100.00		21,410	100.00

Panel B: Descriptive statistics for variables

	Stand-alone Firms					Group-affiliated firms			
	N	Mean	Median	Std		N	Mean	Median	Std
Key variable:									
TaxAvoid	45,166	0.117	0.077	0.200		21,410	0.119	0.082	0.194
Firm-level:									
Dual	45,166	0.007	0.000	0.082		21,410	0.021	0.000	0.141
FamilyFirm	45,166	0.039	0.000	0.194		21,410	0.051	0.000	0.221
Pre-Tax ROA	45,166	0.088	0.072	0.064		21,410	0.086	0.070	0.062
Size	45,166	5.527	5.379	1.715		21,410	6.469	6.416	1.836
CashSize	45,166	0.166	0.124	0.142		21,410	0.148	0.107	0.131
R&D	45,166	0.011	0.000	0.026		21,410	0.010	0.000	0.024
Lev	45,166	0.216	0.181	0.189		21,410	0.237	0.217	0.187
SalesGrowth	45,166	0.150	0.111	0.160		21,410	0.151	0.112	0.161
CapInt	45,166	0.300	0.272	0.203		21,410	0.313	0.291	0.206
InvInt	45,166	0.130	0.108	0.115		21,410	0.113	0.093	0.101
FirmAge	45,166	10.193	9.000	6.122		21,410	11.057	11.000	6.129
Multi	45,166	0.071	0.000	0.256		21,410	0.068	0.000	0.252
Country-level:									
BTaxC	45,129	0.012	0.011	0.005		21,383	0.012	0.011	0.005
WW	39,342	0.721	1.000	0.449		17,702	0.677	1.000	0.468
TaxEnf	45,166	3.675	4.200	0.960		21,410	3.573	3.700	0.966
TaxRate	45,166	0.310	0.300	0.075		21,410	0.306	0.300	0.075
VarComp	39,957	0.301	0.240	0.125		18,029	0.318	0.280	0.127
Earnvol	45,166	0.722	0.754	0.176		21,410	0.727	0.766	0.175
Legal Factor	44,551	3.622	3.682	1.402		21,083	3.382	3.682	1.423

This table presents descriptive statistics for stand-alone firms and group-affiliated firms for the full sample. Variable definitions are in Appendix A.

Table 3
The effect of the group affiliation on corporate tax avoidance

		Two-Stage Simultaneous Equations	
	OLS (1)	***Stage 1*** (2)	***Stage 2*** (3)
Dep. Variable =	TaxAvoid	Pr(Group Indicator=1)	TaxAvoid
Group	**0.003****		
	(2.21)		
Group Probability			**0.100***
			(1.96)
Firm-level controls:			
Dual	0.007	0.015	-0.007
	(1.26)	(1.16)	(-0.77)
FamilyFirm	-0.020***	0.117***	-0.033***
	(-5.50)	(23.93)	(-4.82)
Pre-Tax ROA	0.170***	0.02	0.175***
	(13.18)	(1.33)	(17.3)
Size	-0.003***	0.029***	-0.001
	(-6.15)	(48.85)	(-0.41)
CashSize	0.003	-0.039***	0.022***
	(0.56)	(-5.29)	(4.12)
R&D	0.077***	0.007***	0.000
	(4.60)	(3.12)	(-0.54)
Lev	0.034***	-0.051***	0.033***
	(7.78)	(-9.46)	(7.51)
SalesGrowth	0.132***	-0.004	0.076***
	(26.88)	(-0.89)	(28.63)
CapInt	0.008**	-0.008	0.034***
	(1.97)	(-1.28)	(8.71)
InvInt	-0.044***	-0.141***	0.006
	(-5.64)	(-13.48)	(0.58)
FirmAge	0.001***	-0.001**	0.000
	(4.78)	(-2.53)	(-1.29)
Multi	0.018***	0.006	0.027***
	(5.41)	(1.32)	(9.22)
Instrumental Variables:			
Idiosyncratic Risk		0.262***	
		(3.52)	
RD_Intensity		0.736***	
		(9.64)	
External Finance Dependence		0.131***	
		(5.17)	
LernerIndex		0.28***	
		(7.13)	
Index Return at Listing		-0.015***	
		(-4.58)	
Year dummies	Yes	Yes	Yes

Industry dummies	Yes	No	Yes
Country dummies	Yes	Yes	Yes
Obs.	66,576	90,790	66,576
R^2 / Pseudo R^2	0.27	0.09	0.23
Partial F-Statistic		F = 141.12 (P-value < 0.0001)	
Over-identification test		Chi-sq = 176.52 (P-value = 0.0000)	
Under-identification test		Chi-sq = 176.52 (P-value = 0.0000)	
Weak Identification Test		Cragg-Donald Wald F = 35.28	
		Stock-Yogo C.V.: 10% Max IV size 26.87 Stock-Yogo C.V.: 15% Max IV size 15.09	
Endogeneity Test		Chi-sq = 3.77 (p < 0.05)	

The dependent variable is the extent of tax avoidance. Data are annual for the period 2000–2013. Variable definitions are in Appendix A. Panel A presents OLS regression results. Panel B presents results for a two-stage simultaneous equation estimation. In the first stage, the dependent variable is an indicator variable that equals to one if the firm is in a business group. The estimated probability is an independent variable in the second stage. Standard errors are robust standard errors clustered by year and country (Peterson 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively

Table 4
The effect of business group affiliation on corporate tax avoidance: Emerging versus developed markets

	Developed Market		***Emerging Market***
	(1)		(2)
Group	**0.008*** **		**-0.004***
	(3.29)		**(-1.86)**
Firm-level controls:			
Dual	-0.008		0.009
	(-0.72)		(0.65)
FamilyFirm	-0.023***		-0.013**
	(-3.05)		(-1.98)
Pre-Tax ROA	0.185***		0.157***
	(5.89)		(6.43)
Size	-0.004***		-0.000
	(-3.92)		(-0.06)
CashSize	0.018		-0.019*
	(1.33)		(-1.87)
R&D	0.004		0.114***
	(0.10)		(2.95)
Lev	0.039***		0.024***
	(4.54)		(2.79)
SalesGrowth	0.163***		0.097***
	(11.56)		(9.65)
CapInt	0.015***		-0.002
	(3.11)		(-0.27)
InvInt	-0.057***		-0.013
	(-5.37)		(-0.92)
FirmAge	0.001***		-0.000
	(2.82)		(-0.33)
Multi	0.022		0.011
	(1.65)		(0.80)
Year dummies	Yes		Yes
Industry dummies	Yes		Yes
Country dummies	Yes		Yes
Obs.	40,951		25,626
Adj. R^2	0.24		0.26

The table presents OLS regression results with the dependent variable representing the extent of tax avoidance. "Group", is an indicator variable set equal to one if the firm is affiliated with a business group, and 0 otherwise. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 5
Large Group Indicator

Model	***Overall Sample***	***Developed Market***	***Emerging Market***
Large Group	**0.007*****	**0.011*****	**-0.001**
	(3.20)	**(3.37)**	**(-0.45)**
Firm-level controls:			
Dual	0.003	-0.020	0.008
	(0.40)	(-1.57)	(0.55)
FamilyFirm	-0.017***	-0.006	-0.025***
	(-3.06)	(-0.50)	(-2.89)
Pre-Tax ROA	0.202***	0.199***	0.205***
	(10.61)	(4.96)	(7.40)
Size	-0.004***	-0.005***	-0.001
	(-5.40)	(-4.60)	(-0.42)
CashSize	0.008	0.042**	-0.043***
	(0.91)	(2.58)	(-3.32)
R&D	0.094***	0.019	0.130***
	(3.69)	(0.36)	(2.63)
Lev	0.034***	0.038***	0.019*
	(5.35)	(3.22)	(1.77)
SalesGrowth	0.135***	0.173***	0.096***
	(18.63)	(10.92)	(7.67)
CapInt	-0.008	0.002	-0.017*
	(-1.26)	(0.21)	(-1.87)
InvInt	-0.067***	-0.078***	-0.039*
	(-6.28)	(-5.65)	(-1.87)
FirmAge	0.001***	0.001***	0.000
	(4.96)	(3.48)	(0.95)
Multi	0.022***	0.020	0.040***
	(4.47)	(1.59)	(3.37)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Obs.	29,741	18,079	12,384
Adj. R^2	0.27	0.26	0.26

The table presents OLS regression results with the dependent variable representing the extent of tax avoidance. "Large Group", is an indicator variable set equal to one if the firm is affiliated with a business group with more than three firms, and 0 otherwise. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 6
Shock to the Business Group Ownership Structure:
Evidence from Merger and Acquisition, and Divestiture

Model	***Overall Sample***	***Developed Market***	***Emerging Market***
ΔGroup	**0.009***	**0.017****	**-0.008**
	(1.69)	**(2.31)**	**(-0.67)**
Firm-level controls:			
ΔDual	0.058**	0.007	0.162***
	(2.23)	(0.22)	(5.03)
ΔFamilyFirm	-0.008	-0.012	0.003
	(-0.54)	(-0.64)	(0.15)
ΔPre-Tax ROA	0.470***	0.615***	0.222
	(5.11)	(5.78)	(1.63)
ΔSize	0.007	0.031**	-0.029**
	(0.67)	(2.20)	(-2.14)
ΔCashSize	0.007	0.028	-0.015
	(0.18)	(0.63)	(-0.26)
ΔR&D	-0.603	-0.710	-0.309
	(-1.18)	(-1.49)	(-0.47)
ΔLev	0.094***	0.088**	0.109**
	(3.32)	(2.39)	(2.51)
ΔSalesGrowth	0.139***	0.142***	0.116***
	(5.62)	(4.36)	(2.86)
ΔCapInt	-0.159***	-0.119	-0.126**
	(-3.04)	(-1.65)	(-2.21)
ΔInvInt	-0.042	-0.104	0.042
	(-0.55)	(-1.13)	(0.38)
ΔFirmAge	0.012***	0.010***	0.020***
	(7.00)	(5.12)	(5.77)
ΔMulti	0.015	0.010	0.054*
	(1.02)	(0.55)	(1.81)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Obs.	3,604	2,561	1,043
Adj. R^2	0.14	0.15	0.16

The table presents OLS regression results with the dependent variable representing the change in levels of tax avoidance two years before and after the merger and acquisition as well as divestiture, which induces firms to be affiliated to the business group. "ΔGroup", is an indicator variable set equal to one if the firm is affiliated with a business group after the merger and acquisition as well as divestiture, -1 if the firm is not affiliated with a business group after the merger and acquisition as well as divestiture, and 0 otherwise. All the change values (Δ) are computed as the difference of a given variable two years before and after the merger and acquisition. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 7
Controlling for Country Characteristics

Model		***Overall Sample***	***Developed Market***	***Emerging Market***
Group		**0.003***	**0.008****	**-0.000**
		(1.66)	**(2.15)**	**(-0.11)**
Firm-level controls:				
Dual		0.002	-0.019	0.012
		(0.25)	(-1.30)	(0.69)
FamilyFirm		-0.009**	0.010	-0.018*
		(-2.28)	(0.72)	(-1.96)
Pre-Tax ROA		0.223***	0.244***	0.176***
		(15.61)	(5.47)	(4.65)
Size		-0.005***	-0.006***	-0.001
		(-9.28)	(-4.81)	(-0.54)
CashSize		-0.036***	0.023	-0.041***
		(-5.44)	(1.24)	(-3.04)
R&D		0.106***	0.095*	0.089**
		(5.95)	(1.77)	(2.14)
Lev		0.029***	0.035***	0.015
		(6.15)	(2.78)	(1.04)
SalesGrowth		0.146***	0.174***	0.080***
		(26.89)	(10.13)	(6.01)
CapInt		0.007	0.006	-0.010
		(1.46)	(0.64)	(-0.93)
InvInt		-0.032***	-0.061***	-0.020
		(-3.70)	(-4.35)	(-0.79)
FirmAge		0.001***	0.002***	-0.002***
		(4.49)	(3.56)	(-3.29)
Multi		0.041***	0.042***	0.051***
		(12.60)	(3.15)	(3.82)
Country-level controls:				
BTaxC		-8.064***	-8.402***	-0.968
		(-31.79)	(-4.99)	(-0.46)
WW		-0.044***	0.027	-0.095**
		(-16.34)	(1.63)	(-2.03)
TaxEnf		-0.029***	-0.025***	-0.033
		(-17.83)	(-2.73)	(-1.30)
TaxRate		0.004	-0.335***	0.732***
		(0.28)	(-3.54)	(4.20)
VarComp		0.192***	0.089*	0.199***
		(20.09)	(1.66)	(2.64)
Earnvol		-0.012	0.279***	-0.158**
		(-1.56)	(4.29)	(-2.40)
Legal factor		-0.010**	-0.008	-0.024***

		(-2.42)	(-1.53)	(-3.39)
Year dummies		Yes	Yes	Yes
Industry dummies		Yes	Yes	Yes
Country dummies		No	No	No
Obs.		57,044	37,887	19,157
Adj. R^2		0.24	0.21	0.26

The table presents OLS regression results with the dependent variable representing the extent of tax avoidance. "Group", is an indicator variable set equal to one if the firm is affiliated with a business group, and 0 otherwise. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 8
Excluding Japan

	Full Sample		***Developed Market***			***Developed Market/Code Law Countries Excluding Japan***	
	(1)	(2)	(3)	(4)		(5)	(6)
Group	**-0.001**		**0.002**			**0.013*****	
	(-0.55)		**(0.70)**			**(4.10)**	
Large Group		**0.003**		**0.003**			**0.014****
		(0.94)		**(0.67)**			**(2.28)**
Firm-level controls:							
Dual	0.012**	0.009	0.008	-0.001		-0.026***	-0.044***
	(2.14)	(1.17)	(0.80)	(-0.09)		(-2.96)	(-3.83)
FamilyFirm	-0.017***	-0.016***	-0.018**	-0.003		-0.009*	0.003
	(-4.90)	(-2.89)	(-2.38)	(-0.22)		(-1.75)	(0.27)
Pre-Tax ROA	0.124***	0.147***	0.104***	0.084**		0.039	0.027
	(8.81)	(7.01)	(4.33)	(2.37)		(1.38)	(0.55)
Size	-0.003***	-0.004***	-0.004***	-0.005		-0.006***	-0.007***
	(-5.29)	(-4.56)	(-3.00)	(-0.76)		(-5.17)	(-3.76)
CashSize	0.007	0.013	0.039***	0.083***		0.027**	0.037
	(0.96)	(1.29)	(3.33)	(4.99)		(1.97)	(1.50)
R&D	0.044**	0.074***	-0.088**	-0.050		-0.020	0.081
	(2.57)	(2.74)	(-2.42)	(-0.76)		(-0.60)	(0.86)
Lev	0.022***	0.017**	0.017**	-0.002		0.014	-0.009
	(4.40)	(2.31)	(2.24)	(-0.16)		(1.40)	(-0.54)
SalesGrowth	0.099***	0.100***	0.100***	0.104***		0.102***	0.127***
	(18.67)	(12.66)	(10.91)	(8.21)		(8.72)	(6.30)
CapInt	0.009*	-0.008	0.025***	0.008		0.014	-0.037**
	(1.90)	(-1.25)	(3.99)	(0.820		(1.46)	(-2.37)
InvInt	-0.043***	-0.072***	-0.049***	-0.072***		-0.072***	-0.113***
	(-5.00)	(-5.62)	(-4.57)	(-4.75)		(-4.39)	(-4.07)
FirmAge	-0.001***	-0.000	-0.001***	-0.001		0.000	0.002***
	(-3.54)	(-0.66)	(-2.99)	(-1.07)		(0.50)	(3.44)
Multi	0.025***	0.29***	0.036***	0.036***		0.135***	0.142***
	(7.48)	(5.96)	(3.05)	(3.30)		(17.84)	(11.58)
Year dummies	Yes	Yes	Yes	Yes		Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes		Yes	Yes
Country dummies	Yes	Yes	Yes	Yes		Yes	Yes
Obs.	49,313		23,688			13,367	4,494
Adj. R^2	0.21		0.20			0.16	0.19

The table presents OLS regression results with the dependent variable representing the extent of tax avoidance. "Group", is an indicator variable set equal to one if the firm is affiliated with a business group, and 0 otherwise. "Large Group", is an indicator variable set equal to one if the firm is affiliated with a business group with more than three firms, and 0 otherwise. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 9
The effect of business group affiliation on corporate tax avoidance: Within group analysis

Panel A: Overall Sample

	(1)	(2)	(3)
Ultimate owners' direct ownership	**-1.599****		
	(-2.47)		
PctForeignSales		**-0.034****	
		(-8.42)	
Vertical			**0.004**
			(1.11)
Firm-level controls	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Obs.	19,616	21,410	16,381
Adj. R^2	0.19	0.13	0.26

Panel B: Emerging versus developed markets

	Developed Market	***Emerging Market***	***Developed Market***	***Emerging Market***	***Developed Market***	***Emerging Market***
Ultimate owners' direct ownership	**-0.015**	**-2.401****				
	(-1.22)	**(-2.29)**				
PctForeignSales			**-0.009**	**-0.061*****		
			(-0.70)	**(-3.81)**		
Vertical					**-0.002**	**0.008***
					(-0.42)	**(1.74)**
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	11,242	8,374	12,670	8,740	9,013	7,368
Adj. R^2	0.19	0.25	0.14	0.12	0.22	0.27

The table presents OLS regression results with the dependent variable representing the extent of tax avoidance. Variable definitions are provided in Appendix A. T-statistics in parentheses are based on robust standard errors clustered by country and year (Petersen, 2009). ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.